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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/659,627	09/10/2003	Raffaele Correale	02-42 US	5606

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EXAMINER	
SAYOC, EMMANUEL	
ART UNIT	**PAPER NUMBER**
3746	

DATE MAILED: 09/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/659,627	CORREALE, RAFFAELE	
	Examiner	Art Unit	
	Emmanuel Sayoc	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *17-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11 and 13-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 September 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/10/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-16, drawn to a vibration pumping stage for vacuum pumps, classified in class 417, subclass 413.1.

II. Claims 17-20, drawn to a molecular vacuum pump, classified in class 417, subclass 244.

2. The inventions are distinct, each from the other because of the following reasons:

Inventions II. and I. are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the molecular vaccum pump does not require the control device placed onto the supporting base (as opposed to between the support base and vibrating assembly in the combination). Furthermore the vibration stage of the combination dies not require a sinusoidal AC power supply, or that the vibrating assembly be a planar resilient membrane, or that the membrane be rectangular, substantially H-shaped, or that it have side extension contact areas for the

membrane and the electrode. The subcombination has separate utility such as an electromagnetic actuator unrelated to a pumping application, and it certainly can be used in a pump with only a single pumping stage, contrary to that of the combination.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. Because these inventions are distinct for the reasons given above and the search required for Group II. is not required for Group I., restriction for examination purposes as indicated is proper.

5. During a telephone conversation with Bella Fishman on 9/1/2005 a provisional election was made without traverse to prosecute the invention of Group I., claims 1-16. Affirmation of this election must be made by applicant in replying to this Office action. Claims 17-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Drawings

6. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the vibration membrane of parallelepipedal rectilinear shape in claim 12, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 14 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear in claim 14 how the vibration membrane in the Figures constitutes a parallelepipedal rectilinear shape. It is assumed the applicant is claiming a parallelepiped shape, which is "a solid with six faces, each a parallelogram and each being parallel to the opposite face," where a parallelogram is "a four-sided plane figure with opposite sides parallel".

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Quenzer et al. (U.S. 6,168,395 B1).

In Figures 2, 10, and 11, Quenzer et al. teach a vibrating actuator assembly usable for valves and particularly as a pumping stage for micro vacuum pumps (see Abstract). Note that the pumps in Figure 10 and 11 use the valve actuator in Figure 2 as a pumping mechanism). The device comprises a supporting base (100), and a vibrating assembly (20, 20a,b,c,d) fastened to the supporting base (100). The vibrating assembly comprises an active surface

(20a,b) by which the deflection of the molecules of surrounding gas (or any fluid) is caused during vibration of the vibrating assembly (20, 20a,b,c,d). A control device (electrodes 11, 12, 21, 22 – electrode controls motion of the membrane) are placed onto said supporting base (100), within a recess or cavity in the supporting base (100) to make the vibrating (20, 20a,b,c,d) assembly vibrate and consequently cause deflection of the gas molecules.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 2-4, are rejected under 35 U.S.C. 103(a) as being unpatentable over Quenzer et al., as applied to claim 1.

Quenzer et al., set forth a device as described above, which is substantially analogous to the claimed invention. The Quenzer et al. device differs from the claimed invention in that there is no explicit teaching of the substrate comprising a silicon wafer.

The Quenzer et al., reference describes a device substantially made out of silicon material. The examiner takes official notice that it was well known to

manufacture electronic chips out of silicon due to its ideal semiconductor properties. The substrate (100) is described as an active chip. The membrane (20) is fabricated out of silicon, and the substrate is formed using common silicon chip etching processes, see column 4 lines 41-53, column 5 lines 33-57. Furthermore the electrode (11, 12, 21, 22) attachment to the substrate (100) is describes as a silicon-silicon bond. It is evident, that the substrate chip (100) is also made of material comprising silicon, thus constituting a silicon wafer.

The control device (11, 12, 21, 22) is placed between the supporting base (100) and the vibrating assembly (20, 20a,b,c,d).

A variable electric field is applied between said electrode (11, 12, 21, 22) and the vibrating assembly (20, 20a,b,c,d) to cause vibration of said vibrating assembly (20, 20a,b,c,d) with respect to said supporting base (100).

12. Claims 5-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quenzer et al., as applied to claim 4, and in further view of Cabuz et al. (U.S. 6,351,054 B1).

Quenzer et al., set forth a device as described above, which is substantially analogous to the claimed invention. The Quenzer et al., device differs from the claimed invention in that there is no explicit teaching of the electric field generated by a sinusoidal signal and the sinusoidal signal has a frequency close to the resonance frequency of said vibrating assembly.

Cabuz et al. in Figure 8 describes an electrostatic actuator with a substrate (11), a diaphragm (13, 15) and electrodes (shown and tagged). An alternating current source (see abstract, column3 lines 23-65), which has a sinusoidal signal with a frequency, is connected to the electrodes thus producing a variable electric field and vibration of the diaphragms (13, 15). A.C. power provides a natural alternating excitation of electrodes at its carrier frequency. Cabuz et al. teaches an AC voltage electrode driving device that allows for significant reduction in response time and power consumption. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to modify the Quenzer et al. device by, incorporating the AC power driving source and device as taught by Cabuz et al., in order to advantageously significantly reduce vibration member response time and power consumption. It was well known in the art that excitation of objects at its natural resonant frequency produces maximum response a minimum input. In column 3 lines 45-57, Cabuz et al. describe the modulation of the AC voltage magnitude and frequency to optimally fit the actuation application. With respect to the specific excitation frequency, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Swain et al., 33 CCPA (Patents) 1250, 156 F.2d 239, 70 USPQ 412; Minnesota Mining and Mfg. Co. v. Coe, 69 App. D.C. 217, 99 F.2d 986, 38 USPQ 213; Allen et al. v. Coe, 77 App. D.C. 324, 135 F.2d 11, 57 USPQ 136.

In Quenzer et al., the vibrating assembly (20, 20a,b,c,d) is a planar resilient membrane.

Quenzer et al., the vibrating assembly membrane (20, 20a,b,c,d) is substantially rectangular (see two rectangular membranes 20c,d encompassing surfaces 20a,b, Figure 2) and is fastened to said supporting base at its ends corresponding to the minor sides of the rectangle.

The Quenzer et al. membrane is (20, 20a,b,c,d) is also substantially H-shaped, with the central connection (covering passage 30) and is fastened to said supporting base at its four ends (100).

The Quenzer et al. membrane is (20, 20a,b,c,d) is fastened to the substrate (100) along a peripheral rim (see edges of the membrane sandwiched between chip 200 and 100), whereby the membrane is suspended above the cavity.

The Quenzer et al. substrate (100) is rectangular in shape and has a peripheral rim (outer portion of the rectangle). The vibration membrane (20, 20a,b,c,d) is fastened to the supporting base along the peripheral rim, which surrounds the cavity containing electrodes (11, 12, 21, 22), whereby a side extension (20b,c) partly overlaps the peripheral rim so as to define a corresponding first contact area (at least this area contact the chips 100 and 200). The electrodes (11, 12, 21, 22) comprise a side extension (2a, 2b) such that the electrode partly overlaps (with 2a, 2b) the peripheral rim of the supporting base (100) so as to define a corresponding second contact area (2a and 2b contact chips 100 and 200).

13. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Quenzer et al., as applied to claim 4, and in further view of Eggleston (U.S. 862,867).

Quenzer et al. sets forth a device as described above, which is substantially analogous to the claimed invention. The Quenzer et al., device differs from the claimed invention in that there is no teaching of the vibrating assembly comprising a rigid membrane supported by resilient members or suspension springs placed between the membrane and the supporting base, where the resilient members are fastened to the supporting base. Essentially what is claimed is a bellows vibrating assembly. Within the art of collapsible wall pumping devices, and in general conditions, the equivalence of planar diaphragm or membrane pumping elements and bellows pumping membranes was well known in the art. Eggleston in Figures 3 and 4 shows the general equivalence of a bellows and a diaphragm in collapsible wall pumping devices, see column 1 line 29-35. First, the fact that the applicant claims a plurality of geometrical shaped embodiments of the vibration membrane is evidence that the particular shape and configuration of the vibration membrane is not he central and critical inventive concept of the claimed invention. Furthermore there has been no indication in the specification why the bellows type vibration membrane is critical over a planar vibration membrane. It is therefore evident that the plurality of vibration membrane configurations is functionally equivalent in the general nature

of the pump invention. The Quenzer et al. device would certainly function substantially the same if a bellows type vibration membrane were used. It would be straightforward to one of ordinary skill in the art to provide the necessary modifications to allow the bellows type membrane to function properly (including proper membrane clearances). Therefore since it has been established that bellows and planar membranes are functionally equivalent in the claimed invention and in the prior art, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify the Quenzer et al. device by, incorporating the bellows type vibration membrane, as taught by Eggleston, as a functionally equivalent design choice. In the combination, and as seen in Eggleston Figure 3, the bellows as a rigid membrane (L3) and a resilient membrane (L2). The resilient membrane (L2) is substantially s-shaped in cross section.

Allowable Subject Matter

14. Claims 12 and 16 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

15. The lack of prior art rejections of claims 14 and 15 is not an indication of allowance otherwise. Patentability will be determined upon clarification of the claimed subject matter and verification that the claimed invention specification does in fact support such matter.

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are cited to further show the state of the art with respect to micro pumps.

U.S. Pat. 6,146,543 to Tai et al. – teach a bellows actuation membrane used for a micro actuator usable in a micropump.

U.S. Pat. 5,836,750 to Cabuz, 6,116,863 to Ahn et al., and 6,247,908 B1 to Shinohara et al. – teach pumps similar tot eh pumping concepts of the claimed invention.

Contact Information

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Sayoc whose telephone number is (571) 272 4832. The examiner can normally be reached on M-F 8-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy S. Thorpe can be reached on (571) 272-4444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Emmanuel Sayoc
Examiner
Art Unit 3746

ECS